Low Carbon Fuel Standard Workshop:
Review of the LCFS Concept Outline

March 25, 2008

California Environmental Protection Agency

Air Resources Board

Approximate Timeline for Today's Meeting:

9 - 9:30	Introduction and LCFS updates
9:30 -11	LCFS applicability and standards (sections 1-2)
11 - 12	Compliance and enforcement (section 3)
12 - 1:30	Lunch
1:30 – 2:30	Stakeholder presentations and follow-up discussion - American Lung Association of California
2:30 – 4:30	Credit and carbon intensity calculations, review of sample calculations in Appendix A, program review and definitions (sections 4 -7 & Appendix)
4:30 – 5	Open discussion and wrap-up

** All items shown are for discussion only **

LCFS Updates

- GREET seminar by Michael Wang on March 18, 2008;

- Meeting with UCB, UCD, DOE, Argonne Lab, Purdue and USEPA to scope out methodology for land use impacts;

- Contracts with UCB, UCD, and others to address issues:
  - UCB working with Purdue on GTAP model or other approach on land use impacts;
  - Working with UCD on potential for biomass feedstocks for transportation fuels;

- Detailed breakdown of GREET model for 4-5 fuel pathways will be posted soon;

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Corrections to LCFS Concept Outline

- Table 5.2.1
  - 1 KWh = 0.031 gge
- Table 5.2.2
  - Diesel adjustment factor for LD and HD is 0.78

1. Applicability of the LCFS

- Applicable and non-applicable fuels
- Applicability exemption

1a-1c. Applicable and Non-Applicable Fuels Under the LCFS

- The LCFS applies to providers of:
  - Gasoline, diesel, natural gas, propane, electricity, hydrogen, E85 and blends greater than 10% ethanol, neat ethanol, B5, B20 and blends up to 20% biodiesel/biomass-based diesel, neat biodiesel/biomass-based diesel;

*** Feedback requested on the inclusion of hydrogen.*

1a-1c. Applicable and Non-Applicable Fuels Under the LCFS, con't

- The LCFS applies to providers of:
  - Fuels used for transportation on-road and off-road;
  - Fuels used for off-road equipment, and locomotive applications;

- The LCFS does not apply to providers of:
  - Aviation fuels and marine fuels not regulated by ARB;

1.d. Applicability Exemption

- **Applicability exemption applies to:**
  - A provider of an alternative fuel (natural gas, propane, electricity, hydrogen, neat ethanol, E85, B5, B20, and neat biodiesel/biomass-based diesel);

- **Basis for exemption:**
  - Aggregate volume of the alternative fuel supplied for transportation use in California must be less than a certain volume per year;

Questions/Comments

2. Fuel Standards

- Overall approach
- Standards for fuels
- Volume obligation for ultra low carbon fuels

2.a. to 2.f. Overall Approach

- A reduction of 10 percent or greater in the average fuel carbon intensity by 2020;

- Declining carbon intensity standard determined separately for gasoline and diesel;

- Reduction, at minimum of 10 percent, may differ for gasoline and diesel;

2.a. to 2.f. Overall Approach, con't

- For alternative fuels, compliance is determine by comparison to the gasoline or diesels standard;

- Carbon intensity values are adjusted by vehicle efficiency adjustment factors;

- Baseline values for gasoline and diesel are determined by ARB lifecycle analyses;

2.1 – 2.2. Standards for Gasoline and Diesel

- ## Gasoline:
  - Baseline could be 92 gCO2e/MJ in 2010;
  - A 10 percent reduction in 2020 would be 83 gCO2e/MJ;

- ## Diesel:
  - Baseline could be 71 gCO2e/MJ in 2010;
  - Note: 71 gCO2e/MJ is based on an adjustment factor of 0.78; Table 5.5.2 shows 0.89 in error;
  - A 10 percent reduction in 2020 would be 64 gCO2e/MJ;

*** Feedback requested on standards for 2025 to 2030 and beyond.*

2.1 – 2.2. Standards for Gasoline and Diesel, con't

- Preliminary linear compliance schedules shown in Tables 2.1 and 2.2;

*** Feedback requested on factors that may impact the slope of a compliance schedule:*

– *Impact of land use change,*

– *Availability of low or very low-carbon biofuels in the 2010 to 2015 timeframe, and*

– *Possible compliance strategies*

Questions/Comments

2.3 to 2.8. Standards for Alternative Fuels

- Standard is determined by comparison to either the gasoline or the diesel standard;

- <u>Dedicated fuel vehicles</u>
  – Standard depends on heavy-duty or light-duty;
  – For heavy-duty application, use the diesel standard;
  – For light-duty application, use the gasoline standard;

2.3 to 2.8. Standards for Alternative Fuels, con't

- **<u>Multi-fuel vehicles</u>**
  - Standard depends on the conventional fuel;
  - If conventional fuel is gasoline, use gasoline standard;
  - If conventional fuel is diesel, use diesel standard;

*** Feedback requested on how to handle fuels for medium-duty.*

2.3 to 2.8. Standards for Alternative Fuels, con't

- Neat ethanol and ethanol blends use gasoline standard;

- Neat biodiesel/biomass-based diesel and blends use diesel standard;

- Table 2.3 summarizes applicable reference standard for each fuel – vehicle system;

*** Feedback requested on types of vehicles and fuel systems.*

Questions/Comments

2.9. Volume Obligation for Ultra Low Carbon Fuel

- For a portion of the transportation fuels sold or imported into California, a percentage of the fuel must be ultra low carbon fuel;

- Definition of ultra low carbon fuel to be determined;

** *Feedback requested on whether a volume obligation for ultra low carbon fuel should be included in the LCFS and the appropriate volume requirement.*

2.9. Volume Obligation for Ultra Low Carbon Fuel, con't

- Two possible approaches:
  - By a certain timeframe (i.e. 2015) or when the total volume of transportation fuels reaches "xx" amount, *require "y" percentage of the fuel from an aggregate volume (based on total sales across all LCFS applicable fuels in California) to be ultra low carbon fuels;*

  - By a certain timeframe (i.e. 2015) or when the total volume of transportation fuels reaches "xx" amount, an individual obligated party with total sales exceeding "z" volumes will be required to produce "y" percentage of ultra low carbon fuel;

2.9. Volume Obligation for Ultra Low Carbon Fuel, con't

- Stakeholders requested to add mandate for specific fuels;

Questions/Comments

3. Compliance and Enforcement

- Compliance requirements
- Options for compliance
- Variance, deficit, and compliance period
- Reporting requirements

- Using default and real data
- Tracking fuels
- Recordkeeping
- Certification & Auditing, and Violations & Penalty

3.1.a – 3.1.b. Compliance Requirements

- An "obligated party" refers to the producer, provider, or importer of fuels applicable under the LCFS;

- An obligated party must submit reports according to the required procedure and reporting frequency;

3.1.c. Compliance Requirements: Options for Compliance

An obligated party must meet at the minimum one of the conditions below to demonstrate compliance with the LCFS:

1. Provide only California fuels that meet the respective standard ($AFCI_{reported}^{XD}$ is less than $AFCI_{reference}$);
2. Provide a mix of higher and lower carbon California fuels that on average meet the respective standard;
3. Use previously banked credits in an amount that equals the credit deficit;
4. Acquire credits from other parties who earned credits by exceeding the standard such that the amount of credits acquired equals the credit deficit;

3.1.d.- 3.1.g. Compliance Requirements: Variance, Deficit, and Compliance Period

- ## Variance provision
  - For events "substantially" outside the control of the obligated party, obligated party may submit documentation for variance under the LCFS;

- ## Deficit allowance
  - Obligated party must clear the deficit by the end of the next compliance period;
  - Obligated party must meet its obligations for that period with sufficient excess credits to clear the deficit;

- ## Compliance by fee payment is not allowed;

- ## Compliance period is determined on a calendar year;

Questions/Comments

3.2. Point of Regulation

Gasoline and diesel

- Consider separately parties that produce or import from parties that purchase the blendstock;

- Producer or importer of CARBOB or diesel:
  – The point at which the CARBOB or diesel is transferred from the production or import facility;
  – The obligated parties are refiners and importers;

- Obligated party that acquires CARBOB or diesel:
  – The point at which the finished gasoline or diesel is produced;
  – The obligated parties are refiners and blenders;

3.2. Point of Regulation, con't

Natural gas, propane, electricity, hydrogen

- The point at which the fuel is supplied to the vehicle;
- The obligated parties are fuel providers;

*** Feedback requested on who should be treated as "providers".*

Neat ethanol or ethanol blends

- Similar approach to gasoline and diesel;
- Consider separately parties that produce or import from parties that purchase ethanol;
- The point of regulation and obligated parties may vary;

Neat biodiesel/biomass-based diesel and blends

- Similar to ethanol

3.3.1. Reporting Requirements

- Periodic compliance reports must be submitted to ARB;

- Report must include, at minimum, the requirements outlined in Table 3.1;

  *** Feedback requested for reporting requirements for non-biofuels.*

- Reports to be submitted on a quarterly basis (work is in progress to define the reporting period);

Questions/Comments

3.3.2. Procedure for Using Default Values

- ARB will provide the default values for the determination of the LCFS-blendstock average fuel carbon;

- Lower level default values represent more conservative estimates of GHG emissions;

- Higher level default values are less conservative estimates of GHG emissions;

- Accuracy levels are defined corresponding to type of default value or data used;

  - Applicable to where real data are allowed;

- ARB provides default values in accuracy levels 1 to 4;

- Accuracy levels shown in Table 3.3;

3.3.3. Procedure for Using Real Data

- For areas where real data may be submitted;

- An obligated party with specific information about their fuel pathways may provide additional qualitative or quantitative data;

- Using real data, GHG emissions can be calculated using the ARB Software Compliance Tool;

  *** Feedback requested on Software Compliance Tool.*

- If a portion of the data used in the calculation is based on real data, the accuracy level is 5; if all data used in the calculation is based on real data, the accuracy level is 6;

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Questions/Comments

3.3.4. Tracking Biofuels

- ARB will use the Federal Renewable Identification Number (RIN) for biofuels;

- ARB will determine the fuel type, feedstock, and processing characteristic information of the RIN;

- Facilities that process multiple feedstocks must provide additional information to segregate fuel batches;

- ARB will develop biofuel facility specific default values for LCFS;

*** Feedback requested for tracking propane, natural gas, hydrogen, and electricity.*

3.3.5. Recordkeeping

- An obligated party must keep all of the following records:
  - Product transfer documents,
  - Copies of all reports submitted to ARB,
  - Records related to each fuel transaction, and
  - Records used for compliance or credit calculations for the duration of the phase-in period;

- All records and documentation are subject to ARB or 3rd party auditing and verification;

Questions/Comments

3.4 - 3.5. Certification & Auditing, and Violations & Penalty

- **Verification protocol**
  - For default or real data submissions

- **Certification procedure**
  - 3rd party auditing

- **Software Compliance Tool**

- **Violations and penalties**
  - Fuels regulation penalties in Health and Safety Code section 43027;

Questions/Comments

4. LCFS Credits

- Credit overview
- Credit calculations
- Credit generation, banking, acquisition and trading
- Credit borrowing
- Credit offsets

4.a – 4.d. LCFS Credit Overview

- Credits awarded for demonstrating "over-compliance" - the reported average fuel carbon intensity value of the fuel ($AFCI_{reported}^{XD}$) is less than the corresponding value of the reference fuel ($AFCI_{reference}$);

- Credits are determined separately for the portion of the fuel used in light-duty and heavy-duty applications; total credit is the sum of the two;

- Obligated parties may apply for credits quarterly basis or by custom schedule submitted to ARB for approval;

- Reports for credits must include, at minimum, the requirements in Table 3.1;

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4.1. Credit Calculations

$$Credits^{XD}(MMT) = \left(AFCI_{reference} - AFCI^{XD}_{reported} \right)(V^{XD})(C) \qquad \textbf{(4.1)}$$

$$Credits^{TOT}(MMT) = Credits^{LD} + Credits^{HD} \qquad \textbf{(4.2)}$$

$$\left(\frac{118MJ}{gge}\right)\left(\frac{tonne}{1x10^6\ gCO_2e}\right)\left(\frac{MMT}{1x10^6\ tonne}\right) = 1.18x10^{-10}\ \frac{(MJ)(MMT)}{(gge)(gCO_2e)}$$

**Terms defined in section 5.2.a and examples shown
in Appendix A of the LCFS concept outline.**

Questions/Comments

4.2 - 4.5. LCFS Credit Transactions

Generation and banking:

- LCFS credits can be generated beginning 2010;

- Credits can be banked without expiration or for a duration that is equal to other CA GHG reduction initiatives such as the AB32 program;

Acquisition and trading:

- Credits can be purchased by and traded between obligated parties and external 3rd party entities;

- Credits can be exported to other CA GHG reduction programs, like AB32;

- Credits cannot be imported from outside LCFS programs;

4.2 - 4.5. LCFS Credit Transactions, con't

Borrowing

- Credit borrowing is not allowed;

Offsets

- Offsets from transportation fuels in sectors not regulated by the LCFS (aviation or non-regulated marine fuels), are not allowed;

- Offsets from non-transportation sectors are not allowed;

5. Determination of Carbon Intensity Values

- AFCI value overview
- Calculation of AFCI
- Conversion and adjustment factors
- Default and custom value approaches

5.a – 5.b. AFCI Value Overview

- Determined on a source-to-wheel basis;

- Use default values approach (section 5.3) or custom values approach (section 5.4);

- All data compilations submitted are subject to ARB review and verification;

5.1. Calculation of AFCI

- ARB tools:
  - ARB will provide a copy of the latest version of a modified ARB GREET model;
  - The latest version number will be provided when available;
  - ARB will provide Software Compliance Tool based on ARB GREET;

5.2. Calculation of AFCI

$$AFCI^{XD}_{reported}(gCO2e/MJ) = \left(\frac{(BAFCI_{system}) \sum_{j=1to17}(K^{j})(V^{j}_{system})}{\sum_{j=1to17}V^{j}_{system}} \right) \quad \textbf{(5.2.1)}$$

$$BAFCI_{system} = \frac{\sum_{i=1}^{n}BAFCI_{i}V_{i}}{\sum_{i=1}^{m}V_{i}} \quad \textbf{(5.2.2)}$$

Terms defined in <u>section 5.2.a</u> and examples shown in <u>Appendix A</u> of the LCFS concept outline.

Questions/Comments

5.2.b – 5.2.d. Conversion and Adjustment Factors

- All volumes must be converted to gasoline gallon equivalents;

  – Error in Table 5.2.1. 1KWh = 0.031 gge

- Vehicle efficiency adjustment factors are used to take into account differences in engine drive-train efficiencies between vehicles of the same category;

  ** *Feedback Requested for current vehicle engine types corresponding to light and heavy-duty applications of each fuel.*

Questions/Comments

5.3. Default Value Approach

Crude oil

- All conventional crude oil

  – A single averaged, default value will be applied;

- Each non-conventional crude oil category

  – A single averaged, default value will be applied;

  – Provider may submit data to demonstrate substantive improvement and use submitted data upon ARB approval;

  ** *Feedback needed for what is substantive.*

- ARB will perform periodic review of crude oil carbon intensity values;

5.3. Default Value Approach, con't

Refinery efficiency

- All refineries – single averaged value;

- Obligated party may submit data to demonstrate substantive improvement not already mandated by other regulations;

  ** *Feedback needed for what is substantive and how to award credit.*

- Upon validation and approval, ARB will provide credits for the improvement towards the diesel or gasoline standard;

5.3. Default Value Approach, con't

Input values

- Input values similar to those in Appendix C will be provided;

Co-products

- ARB will provide co-product calculation methods;
- Values similar to those in Appendix D will be provided;

5.3. Default Value Approach, con't

Land use change

- Land use change must be estimated using latest ARB GHG LUC methodology;

- Values used as input to ARB GREET;

- Work is in progress on developing LUC look-up table;

Sustainability

- ARB will include sustainability criteria consistent with those in the federal regulation;

5.3.6. Sustainability Criteria

- **Consistent with Federal requirements;**

- **EISA 2007 includes some aspects of sustainability:**
  - To address biodiversity, water utilization, soil quality and conservation, ecosystem health, etc.;
  - Will look at impacts outside the United States;

- **The U. K. RTFO includes some sustainability criteria;**

- **Staff working to address inclusion of sustainability criteria into LCFS;**

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5.4. Custom Value Approach

- Data can be submitted to ARB for review and, should approval be granted, be permitted to use instead of default values;

- Custom value approach applies to
  – Refineries with unconventional crude oil;
  – Refineries with substantive improvement in refinery efficiency values;
  – All alternative fuels;

Questions/Comments

6. Program Review

6. Program Review

- ARB will conduct, no later than January 1, 2012, periodic reviews of the LCFS program in all major areas including, but not limited to:

  - Lifecycle analysis,
  - Land use change,
  - Sustainability,
  - Uncertainty,
  - Policy design,
  - Compliance and regulatory process,
  - Economic impact,
  - Environmental justice and multimedia evaluation

7. Definitions

- List shown in section 7 is preliminary;

- Terms used for biodiesel and biomass-based diesel consistent with Federal Trade Commission;

*** Feedback requested on term definitions;*

Questions/Comments

Tentative Future Working Group Meetings

#	Group Name	Approximate Timeframe
1	Lifecycle	Mid or end of April
2	Compliance and Enforcement	Mid or end of April
4	Environmental and Economic	End of April

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